

Satellite (Timed, Aura, Aqua) and In Situ (Meteorological Rockets, Balloons) Measurement Comparability

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Measurements using the inflatable falling sphere often are requested to provide density data in support of special sounding rocket launchings into the mesosphere and thermosphere. To insure density measurements within narrow time frames and close in space, the inflatable falling sphere is launched within minutes of the major test. Sphere measurements are reliable for the most part, however, availability of these rocket systems has become more difficult and, in fact, these instruments no longer are manufactured resulting in a reduction of the meager stockpile of instruments. Sphere measurements also are used to validate remotely measured temperatures and have the advantage of measuring small-scale atmospheric features. Even so, with the dearth of remaining falling spheres perhaps it is time to consider whether the remote measurements are mature enough to stand alone. Presented are two field studies, one in 2003 from Northern Sweden and one in 2010 from the vicinity of Kwajalein Atoll that compare temperature retrievals between satellite and in situ falling spheres. The major satellite instruments employed are SABER, MLS, and AIRS. The comparisons indicate that remotely measured temperatures mimic the sphere temperature measurements quite well. The data also confirm that satellite retrievals, while not always at the exact location required for individual studies, are adaptable enough and highly useful. Although the falling sphere will provide a measurement at a specific location and time, satellites only pass a given location daily or less often. This report reveals that averaged satellite measurements can provide temperatures and densities comparable to the falling sphere.